Initial	Date
DC	3/9/84
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MK	3/9/84

FR/EN
WR SD

MAR 9 1984

MEMORANDUM

To: AWR (Matthews), Region 6

From: Regional Hydrologist, Region 6

Subject: Annual Water Use Report/Management Plan (Lake Andes NWR/WMD)

The subject report has been reviewed and found to be in order. Please extend our thanks to refuge personnel for the timely submission and concise documentation of refuge water use.

To answer your question of water rights requirements for the Broken Arrow WPA, this office was advised in 1978 by the South Dakota Department of Water and Natural Resources that restoration of natural wetlands did not require a water right permit.

However, the anticipated acquisition of a 480-acre tract and proposed construction of additional dams will have to be investigated. These new dikes may not meet the same criteria as the original dams and may, in fact, require water right permits.

Someone from my staff will be contacting refuge personnel to determine any necessary action of which you will be informed. *

Robert G Gra[illegible]

EN:Chesy:mk:3/9/84

* Phone conversation w/ Cheryl & Tuck Stone 5/84 determined this work would be restoration of natural wetland requiring no permits.

ANNUAL WATER MANAGEMENT PROGRAM

Lake Andes National Wildlife Refuge, Lake Andes, SD

Water Unit: Broken Arrow Waterfowl Production Area

I. Introduction

The Broken Arrow WPA in Douglas County, is a 1660 acre tract purchased in 1977. Two drainage systems existed on the property when purchased. The Mud Lake Drain had an upstream watershed of 25,600 acres, while the second system, the New Holland drain had a 12,320 acre watershed. Five ditch plugs or low head dams, with concrete stop log control structures, were installed in 1979 along the drainage ditches, two on the Mud Lake ditch and the remaining three on the New Holland drain. Design specifications for the five dams are as follows:

Embankment Volume YD^3	High Water Contour	Surface Acres	Acre-feet Impounded
Dam #1 - 76	497.6	6.2	5.7
Dam #2 - 755	497.6	27.9	82.6
Dam #3 - 2761	495.6	43.6	163.0
Dam #4 - 586	495.5	34.7	88.3
Dam #5 - 137	495.5	6.3	5.2
	TOTAL	118.7	344.8

A water rights application was not filed with the State Water Rights Commission. Area office personnel at the time, felt that since the project involved restoring drained wetlands, a permit to impound water on this area was not required.

II. 1983 Water Conditions

Above normal precipitation occurred throughout the spring and early summer, filling the impoundments behind dams #1, 2, 4 and 5 to almost capacity. Wet conditions prevented repair work on dam #3, which washed out in July 1982. High temperatures during late summer and fall increased evaporation and greatly reduced the surface acres of the impoundments. In October, the refuge crew repaired the dam #3 washout, installed anti-seep collars and improved spillways on dams #3, 5 and 1. Heavy snows in November and December improved prospects for runoff and refilling of the impoundments.

III. Effects of the past year's water levels on the Broken Arrow Waterfowl Production Area

The newly flooded wetlands attracted numerous waterfowl pairs and brood numbers indicated high production. Shorebirds were much in evidence around the new marsh edges. The permanent water supply had a positive impact on the resident wildlife species such as sharp-tailed grouse, prairie chickens, pheasants and white-tailed deer.

IV. 1984 Management Objectives

The district should receive title in April or May to a 480 acre tract of land west of dam #3. Following engineering by the SCS, an additional 4 or 5 low level dams with half-moon risers, will be constructed along the Mud Lake and New Holland drainage ditches passing through the tract.

Water management plans for 1984 are to contain as much runoff as designed behind the five existing dams and the proposed dams on the new tract. Should any structure appear to be in danger of being damaged or any possiblity of flooding private land develop, stop logs could be pulled to allow release of additional water down the drainage ditches into Platte Creek.

ANNUAL WATER MANAGEMENT PROGRAM

Lake Andes National Wildlife Refuge, Lake Andes, SD

Water Unit: Owens Bay

I. Introduction

The Owens Bay Unit is a 240 acre marsh unit, separated by a dike from the South Unit of Lake Andes. A stop log water control structure is located in the dike to allow water releases into Lake Andes.

Owens Bay, in addition to water from natural runoff, is maintained by a free-flow artesian well. The well, drilled in 1957, originally had a 1000 gpm flow and water right. Well shutdowns during the 1973 DVE outbreak resulted in casing destruction and new casing had to be installed. The new casing, reduced the well opening from 12" to 8", and dropped the flow to approximately 450 gpm, where it is presently stabilized. The present well flow, without adequate spring runoff, is unable to maintain the entire marsh, because of a 39 inch average annual evaporation rate.

II. 1983 Water Conditions

Good spring moisture in 1983 added to the water level of Owens Bay. Between March 1 and August 1, a total of 17.4 inches of precipitation fell. Late summer and early fall were dry with higher than normal temperatures, resulting in increased evaporation. In November and December, 27 inches of snow fell, adding moisture to the wetland. The artesian well remained open throughout the year, with a rate of approximately 450 GPM being added to the Unit.

1983 Water Levels - Owens Bay (Pool Bottom - 1436.52)

Date	Water Level
3/30	1442.16
4/29	1442.37
5/26	1442.37
6/30	1442.47 (over flowing)
8/01	1442.00
9/06	1441.18
9/30	1440.90
10/31	1440.72

III. Effects of the past year's water levels on the ecology of Owens Bay

Waterfowl returning to the Owens Bay Unit in the spring found ideal conditions and the result was increased production. Overwater nesters found suitable conditions and coots and grebes experienced high reproduction. The muskrat population expanded and opened up thick cattail areas, making excellent waterfowl habitat. Fall migrating waterfowl found ideal conditions for food and cover and waterfowl use was high until freeze up.

IV. 1984 Water Management Objectives

Water management activities for 1984 are to contain as much runoff as possible in Owens Bay. The artesian well will continue to run at full flow in order to offset annual evaporation.

ANNUAL WATER MANAGEMENT PROGRAM

Lake Andes National Wildlife Refuge, Lake Andes, SD

Water Unit: Lake Andes

I. Introduction

Lake Andes is a 4730 acre meandered lake, whose water level depends entirely upon annual runoff. Two dikes cut the lake into three units, the North, Center and South. Stop log water control structures are located within each dike, however the lack of a permanent water supply precludes any water level manipulations.

Drainage area size and surface acres for each unit of Lake Andes are shown below. Maximum and average depth figures were determined in 1962, the last time the lake was completely full.

Unit	Drainage Area Acres		Surface Acres of Water	Water Capacity (Acre feet)	Depth when full Max.	Avg.
South	2,000	23%	1,760	16,159	13.5	11.5
Center	11,000	14%	2,359	18,000	14.5	12.9
North	53,000	62%	611	3,015	10.5	9.1
TOTAL	84,800	100%	4,730	~~3,015~~ 37,174	-	-

In 1922, Congress passed a bill establishing a high water elevation of 1437.25 feet msl for Lake Andes via the construction of an artifical outlet on the South Unit. This level was established following local complaints about flooding around the lake.

II. 1983 Water Conditions

Water conditions on Lake Andes were the best since 1979. The year started out with the North Unit almost full and 85% of the Center and South Units covered with water to a depth of 1½-2 feet. Spring rains started early and by mid-April the North Unit was overflowing the control structure. Water continued to top the boards in the control structure until late June, an occurrance not seen on Lake Andes for many years.

The water in the Center Unit reached a depth of approximately five feet and the South Unit reached three feet. Late summer and early fall brought high temperatures (100^{o}+) and increased evaporation and the water level in Lake Andes dropped an average of 1¼ feet by October. Freeze up on all units occurred on November 23.

1983 Water Levels

Date	North Unit	Center Unit	South Unit
3/30	1436.89	1430.43	1429.28
4/15	1437.06	1431.40	1429.48
4/29	1436.85	1431.60	1429.48
5/03	Overflowing	1432.20	1429.70
5/31	1436.56	1432.06	1429.56
6/28	Overflowing	1432.12	1429.62
7/25	1436.68	1432.00	Below Gauge
9/06	1435.85	1431.34	1428.84
9/30	1435.60	1431.10	Below Gauge
10/31	1435.36	1431.00	Below Gauge
Pool Bottoms	1429.25	1427.00	1426.00

III. Effects of the past year's water levels on the ecology of Lake Andes

Water in all three units of Lake Andes attracted a record number of waterfowl breeding pairs. A total of 1,326 breeding pairs were recorded, the second highest count since 1970 and the highest since 1979. Overwater nesting birds such as coots and grebes increased significantly in 1983 with 350-400 pairs of eared grebes located in one colony on the Center Unit. Muskrats expanded their population, moving into deeper water areas as the lake levels rose. Fall migrating waterfowl found abundant food and cover on Lake Andes and use was high until freeze up.

IV. 1984 Water Management Objectives

Management objectives for 1984 are to contain as much runoff as possible in Lake Andes. In the unlikely event the water would reach the 1437.25 ft. level established by Congress, water could be released from the outlet on the South Unit.